Combat Crew

strategic air command

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FLARE

Combat Crew

strategic air command

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ON OUR COVER

Featured is an FAA air traffic controller who tells his story of the operational benefits to be gained from familiarization flights in the B-52 and KC-135. See page 4.

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THE CREW CHIEF CONCEPT of MAINTENANCE

BRIG GEN THOMAS M. RYAN, JR.
Deputy Chief of Staff, Logistics

Reconstitution of our strategic forces set in motion a comprehensive review of the maintenance concepts, polices, and procedures which SAC had been using in support of Southeast Asia air operations. Additionally, the projected austere budget environment requires today's maintenance manager to utilize the most cost effective methods possible to support assigned weapon systems, while devising management innovations which offer possibilities for greater efficiencies in future years.

One area which received an early review was organizational level maintenance; i.e., the launch, recovery, servicing, and inspection of a weapon system. A key worker in the organizational maintenance function is the aircraft crew chief. Unfortunately, in SAC, the role of the crew chief has diminished during the past few years. This demise was driven by the instability and the skill level of the maintenance work force due to frequent PCS moves, lengthy TDYs, and the twelve month policy tour for support of Southeast Asia operations.

To counter this instability, SAC used a team or shift concept for organizational maintenance. While this concept of "pooling" available manpower resources accomplished the job, we forfeited some maintenance continuity and an intangible benefit called "pride of ownership." This loss was manifested in subtle ways, such as the famous answer, "I don't know, sir, I'm not the regular crew chief." Additionally, we found that the number of delayed discrepancies began to accumulate in the aircraft forms, and that aircraft cleanliness regressed.

This situation can be attributed in part to the fact that there was no one individual assigned as the permanent crew chief. Often, a different technician was assigned to recover or launch an aircraft at the morning roll call, and this same technician might not work on that aircraft again for a week or possibly a month because of complex operational requirements. Further, the shift or team concept requires more extensive supervisory follow-up to insure that the required quality and quantity of work is produced.

Two SAC bases, Kincheloe and Grand Forks, recently completed a six month test of the crew chief concept of maintenance. Under this concept, a crew chief and four or five technicians are permanently assigned to each aircraft as the ground crew. It is essentially "their aircraft." One or more of these individuals are with the aircraft any time maintenance is in progress, when the aircraft is on ground alert, and when the aircraft is deployed TDY. These individuals are responsible for monitoring all specialist work, and maintaining the overall condition of the aircraft and the aircraft forms. As the "single manager," they are responsible for the status of the aircraft at all times, and accompany the aircraft through the entire cycle of maintenance—launch, recovery, phase inspection, corrosion control, fuel cell repair, etc.

The test at Kincheloe and Grand Forks resulted in improved alert aircraft changeover, closer monitoring of specialists performing maintenance on aircraft, more responsive aircraft status reporting to job control, a reduction in delayed discrepancies, a visible improvement in aircraft cleanliness, and more professional aircraft forms documentation. Other benefits accrued were increased aircraft system knowledge for ground crew members, and a feeling of professional pride and individual reward for job accomplishment.

For many, the test of the crew chief concept of maintenace reaffirmed a lesson previously learned; that being, the importance of a crew chief permanently assigned to a specific aircraft and his role in maintaining and providing reliable, properly configured aircraft to meet mission requirements.

The crew chief concept of maintenance was implemented commandwide on 1 September 1975. This concept will provide you with a better maintained aircraft and you will have the opportunity before you fly to discuss the status of the aircraft with "the regular crew chief." ★

CONTROLLER IN THE

COCKPIT . . .

DAVID R. McLAREN
Chicago ARTCC

Participation in SAC missions by FAA air traffic controllers is authorized by FAA Facility Management Handbook 7210.3b and Air Force regulations. An air traffic controller is permitted one familiarization flight on a B-52 and a KC-135, but only journeyman controllers directly involved with SAC operations are allowed to participate. Usually these are enroute controllers from ARTCCs involved with large scale SAC missions, refueling tracks, or SAC bases within their flight advisory area. Twenty SAC bases host these visitors. I was lucky enough to be such a visitor.

The amount of time and effort spent in preparation for a mission by SAC crews is astounding. In contrast to airline operations, the mission planning room was seriously quiet even though crowded. I was surprised as I looked over the navigational charts laid out on the tables. There wasn't an airway map among them. I always assumed that everybody used airways, not considering that their usefulness in wartime would be negligible. Another thing, SAC navigators really do navigate. Now there's a nearly lost art in civil aviation.

Radio communications, in the vernacular, are "outta sight." A controller often waits until the last moment before attempting to contact an aircraft. He then can get impatient and sometimes caustic if the pilot he calls does not answer immediately. Before riding in a B-52, I always thought that a less than immediate reply was due to the crew not paying attention. The amount of radio traffic a B-52 crew, and particularly, the copilot, has to monitor and filter through is fantastic.

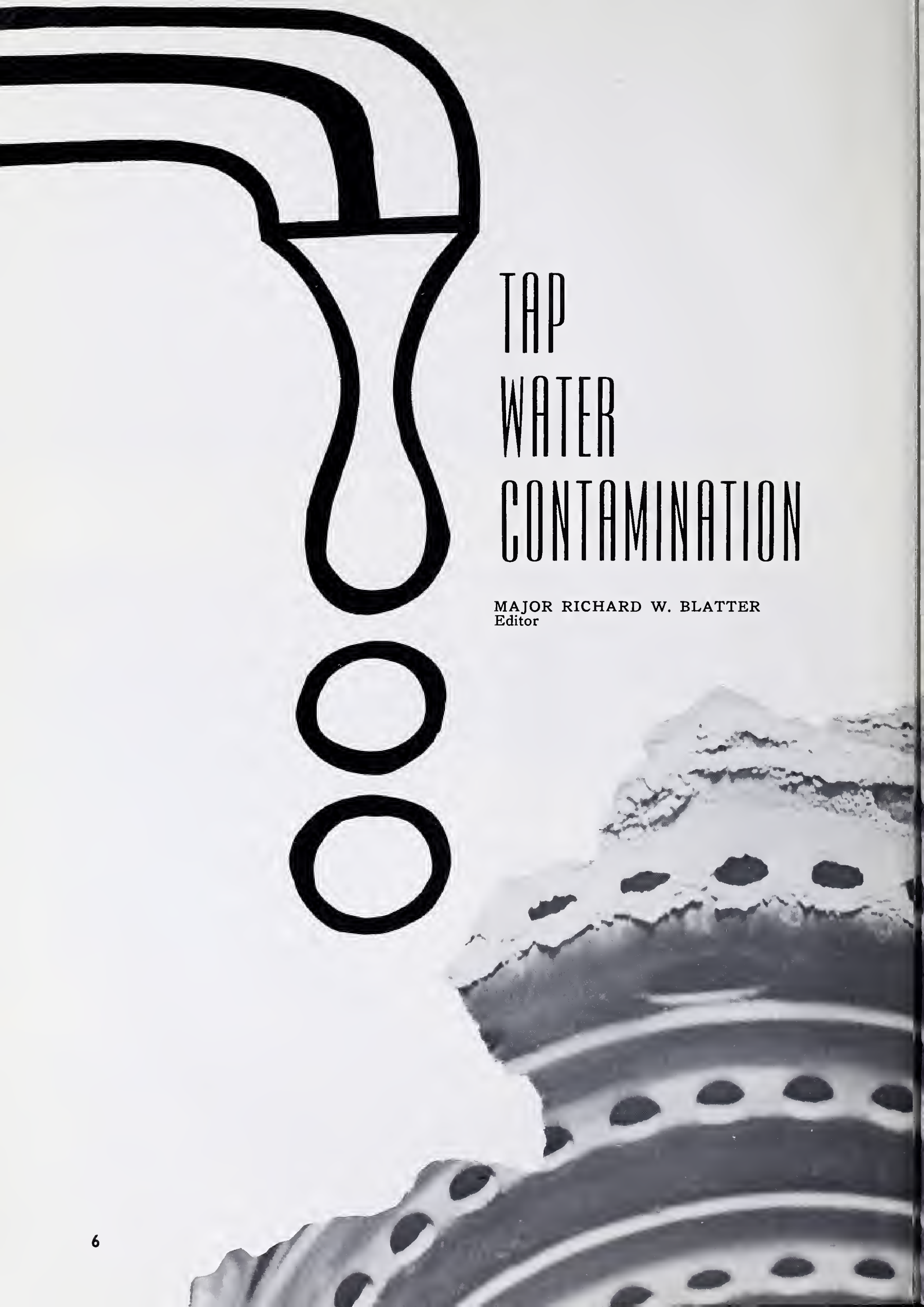
While on the subject of radio communications, one piece of advice: controllers have learned through experience that if a military aircraft and an air carrier or itinerant are converging, and a heading or altitude change must be issued to effect separation, it is easier to attempt to move the military flight. Most military pilots offer less resistance and are apt to begin the change immediately. Nonmilitary pilots tend to question the validity of the revision to their clearances, using up valuable time. But if a controller has waited too long to begin corrective action, (it does happen occasionally) and you are on a missile programming leg or trying to get a celestial fix, he's going to have himself in a bind while you are explaining that you can't make the change without negating the mission. However, if you advise the controller of your mission type each time you make initial contact on a new frequency, you'll help his decision process. Don't rely on your flight plan to carry the word. The controller's flight progress strip does not have the available space for lengthy remarks, and the teletype message is not seen by the controller under normal conditions.

Air refueling tracks are another point. Don't be afraid to ask for an extension or deviation around thunderstorm cells if you think you might need it. Except in the eastern states where traffic congestion is generally the heaviest, you should not have any problem in gaining approval for what you need. Even there, if you give the controller enough notice, he should be able to work out something for you. Until I took my rides with the 449BMW, I didn't know that SAC had the same weather radar return clearance requirement of 20 miles as the airlines require. Thus, don't be under the misconception that the entire ATC system is one big hard and fast rule. We try to be flexible in providing our service—it's what we're paid for.

Refueling in the Buck Arena track with Captain Tidd and his tanker crew R-120 was an experience I really enjoyed. We held southeast of Peoria, Illinois, in a starlit sky waiting for a flight of F-100s. You could see the lights of Chicago in one direction and those of St. Louis in the other. The fighters were behind schedule in arriving at the ARCP, but this only enhanced the opportunity to discuss procedures from both the controller's and aircrew's relative viewpoints, in an ideal classroom. Finally the fighters snuggled up like thirsty sharks and took on their fuel. They were specters of shadows and lights dancing in our wake as they slid in from one side, refueled, and broke away on the other.

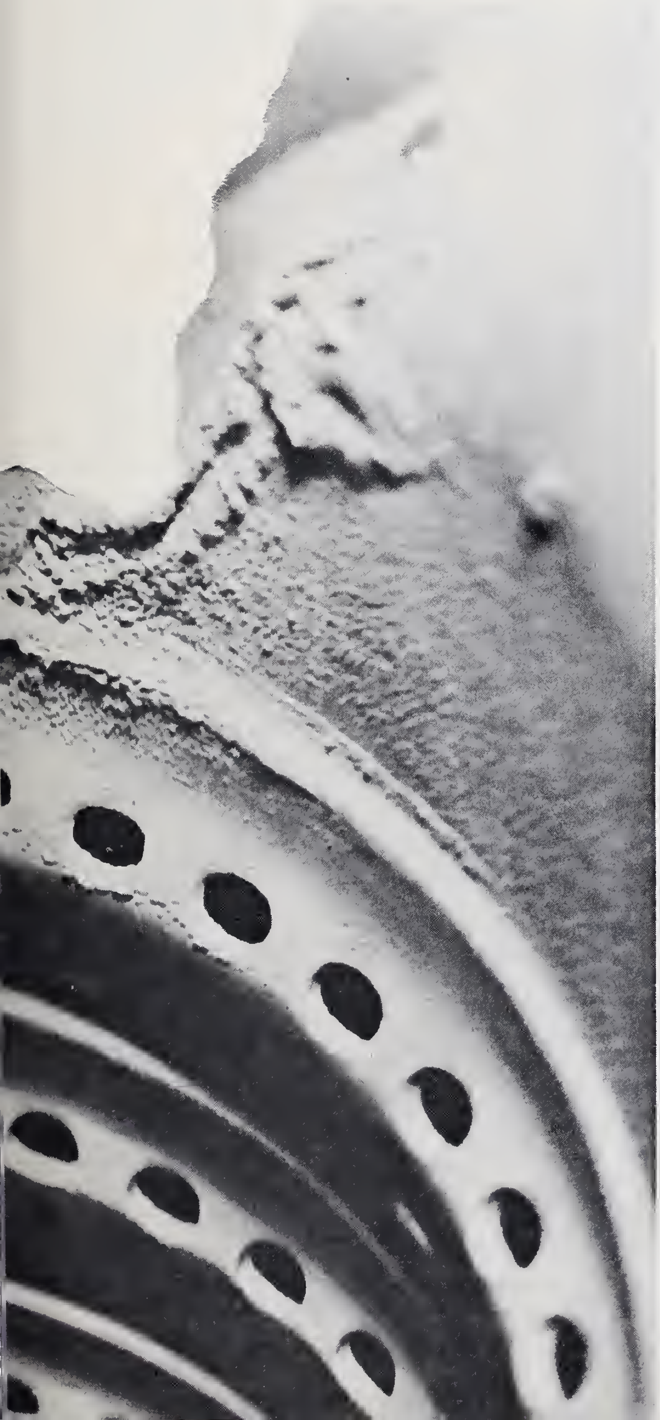
My B-52 Olive Branch flight was also at night and could have been a part of 2001—A Space Odyssey. The myriads of single lights from scattered farms, and the clusters of illuminated towns appearing and disappearing under the smooth black sky was fantastic and seemed detached from reality. The crew was very busy but from the IP seat, the glory of flight unfurled before me without distraction.

SAC crews are dedicated and professional. That's an old cliche, but they see and participate in a world that us "groundlings" rarely have the opportunity to know. Invite a controller along—he'll appreciate a view of your world and the exchange of information will enhance both our missions.



TAP WATER CONTAMINATION

MAJOR RICHARD W. BLATTER
Editor



One of the most insidious and potentially disastrous problems that the B-52 or -135 could experience is the power decay that results from contaminated water used for takeoff thrust augmentation. It rarely happens, but if the problem occurs on your aircraft it could occur on all engines just after liftoff. Under the right, or wrong, conditions, full compressor stalls can occur in only 10 to 20 seconds after first crew warning. "But," you say, "we don't use contaminated water in our aircraft."

You're right, but in at least one instance tap water was used in the KC-135. The accompanying photograph show contamination buildup on the inside of the engine.

What happens is not very complex. Contaminants in the tap water accumulate in the form of mineral deposits on the compressor blades and stator vanes resulting in a decrease in their efficiency. The same deposits restrict cooling air flow around combustion chambers. Meanwhile the fuel control is calling for more fuel causing the EGT to increase rapidly. As the deposits continue to build up, dramatic power loss is experienced. Engine instrument indications are similar to those experienced during engine icing conditions. In the case of the engine part depicted, two takeoff power applications accumulated enough deposit to render the aircraft almost unflyable.

In Section V of the B-52 (less the H model) and KC-135 flight manuals, it states that "Normally water with less than 10 parts solids per million parts water (PPM) will be used in the water injection system." Water with greater impurities is restricted to emergency use only. T.O. 2-1-14, Water and Alcohol Mixture for Aircraft Engines, repeats this requirement for all USAF and NATO aircraft and further states that ". . . in tactical situations where water purifying equipment is inoperative or unavailable, up to 50 PPM total solids may be allowed!" At SAC bases, contaminants in clear tap water run from 100 to 500 PPM with an average of 250 PPM. In addition, the flight manuals state that water with impurities exceeding specified limits will coat compressor blades with deposits which can dangerously lower engine thrust and stall margins, especially during a subsequent dry takeoff attempt.

We've got sufficient guidance. As the photograph indicates, contamination has occurred before but don't let it happen on your aircraft. If you are operating from your home base or an unfamiliar one, make absolutely sure your airplane is serviced properly.

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3
7

TIME ON OUR HANDS

CAPTAIN WILL D. MITCHELL
903 AREFS, Beale AFB

A scant hour ago, 60 seconds passed into obscurity, unnoticed. Yet if you stare at your hack watch for 60 seconds, you may remember them for months. Time can pass quickly or slowly. This is vastly more true in an airplane; five seconds can pass in an instant, or they can be long enough for your life to flash before your eyes. There are men alive today who would have been dead had they taken five seconds longer at a task, and there are men dead who could have saved their lives if they had found but a few additional seconds.

It is said that only the Almighty can manufacture time. Not so. There exists a machine that can manufacture pure time from such raw materials as foresight, planning, organization, and experience. It is called the brain. With those raw materials and others, you can manufacture the time you need to become the world's greatest and safest instrument pilot.

Example: Col Perry, with 6000 hours in the KC-135, sees that a half degree pitch change is required. His mind calculates it, his hands make it, and he forgets it. Seconds later, his heading is off a degree and he corrects. Seconds later still, he sees that airspeed is a knot high and decreasing. A tiny power change catches it. It slowly increases another knot, pauses, and drifts back down to the charted figure. It looks so easy, and it is.

Contrast: Lt Schloe, with only 300 total hours, is busy confusing his controller with an incomplete and nonstandard radio call, and misses the pitch change requirement. It grows to two degrees, and the plane is climbing at 1400 fpm before he catches it. Inevitably, he overcorrects or undercorrects, and flies a miniature vertical-S while chasing his altitude, airspeed, pitch, and power. He completely misses the heading error, and obliterates airspeed control, a problem that he had nearly solved.

The difference is time. Doing things precisely and quickly, Col Perry manufactures the time to think, the time to find a heading error, the time to plan ways to manufacture more time. Lacking preparation, insight, and experience, Lt Schloe had to spend 45 seconds clearing the fog from a controller's mind, while his airplane flew itself—with a good deal less precision than it should have been flown.

How can you, a flier, make your time machine more efficient? How can you manufacture inflight time, perhaps to save your life one day? There are many techniques, but first, discipline yourself. Decide to set tough standards of conduct in the cockpit. Then once you have resolved to push for excellence, you can try these things—and invent more.

Many seconds can be manufactured through good radio discipline: think—then talk. Anticipate and answer questions before they are asked. When the controller asks for clarification, you lose 15 seconds minimum. No sweat, unless you bomb through a minimum altitude into a hill, or a recheck. But there is more.

Think back. You can detect a student traffic controller almost instantly, but did you ever think about how you do it? He gives himself away with a nonstandard radio transmission somewhere, and you instantly know that something is different. The experienced man uses standardized phraseology because these are designed to pack the most possible information into the shortest time. By getting into the habit of using standard phrases, a man does not have to think so hard about what to say. He can devote more time to avoiding the Cessna he is telling the controller about. The phrases don't have to be standard USAF terminology, just phrases the pilot uses habitually. If standard terminology is published, such as procedures for initial contact in the Enroute Supplement, of course, these should be used.

The flier who uses standard phrases saves radio transmissions, and suddenly finds the time to do many other vital tasks. But there is more. Learn to abbreviate. There is nearly always a shorter way of saying it, no matter what it is. Flying with another B-52 in cell formation over the Pacific, you might transmit "Say airspeed" and hear "315." In the right circumstances, that would be entirely sufficient. But never abbreviate yourself into confusion. On tower frequency at home, "Say airspeed" would be met with confused silence while about 10 people wondered who wanted what and why. Anything that manufactures time with the radio works on interphone. But since you can preplan interphone transmissions with your crew, you can abbreviate to a much greater extent. This is the essence of good crew coordination. It's almost like mind reading.

When Lt Schloe hops in the seat for an ILS, his first action is to report on interphone. Then he straps in, familiarizes himself with airspeeds, the checklist, etc. That is good, but Col Perry has an even better technique. He instructs Lt Schloe to first put on the headset and listen to the radios and interphone, then strap in and familiarize himself with things. When he is ready to go to work, he reports in on interphone. It is a simple convention that only works between those two men, but now the copilot's on call means several things and the Colonel doesn't have to ask questions. Each man has an extra half minute to think, observe, plan.

That example may not work for you; it was certainly not intended as a recommendation. But it's the principle that is important. Develop conventions with your crew that save time. It's good crew coordination.

Crew coordination and aerial expertise are rather like the chicken and the egg. Nobody knows for certain which came first. But without chickens there would be no eggs, and without eggs there would be no chickens.

BIG INSTRUMENT

CAPTAIN JOHN L. WILSON
1 CEVG, Barksdale AFB

This month's article is devoted to a series of short subjects about which we have received questions and also some new items of interest. They are not intended to be all inclusive but should stimulate your thinking. Additonal information on these subjects can be obtained by referring to the source documents listed at the end of each item.

OPTION APPROACH

During your transition training have you ever considered requesting an option approach? An option approach allows the pilot, at his discretion, to terminate the approach in either a touch-and-go, missed approach, low approach, stop-and-go, or full stop landing. You must have specific clearance to perform the option approach. By use of the option, instructor pilots can gain flexibility in their training by simulating various weather conditions. Practice in the procedures required when approaching minimums and anticipating the possibility of a go-around will make student training more realistic. You may not always be cleared for the option due to traffic, but when used effectively it can improve crew training in these days of fewer flying hours. (FLIP General Planning)

GYRO-OUT APPROACHES

When was the last time you flew a practice gyro-out approach? If you are like many pilots it was probably at UPT. Do you remember how? The gyro-out approach is based on predetermined rates of turn. By his radar scope presentation the controller monitors your direction of flight, and tells you when and in what direction to turn, and when to stop turn. During transition to final approach you should use a standard rate turn (3° per second). A half standard rate turn (1½° per second) is used once established on final. A standard rate turn will result in bank angles over 30° (when TAS is over 210 KTS). In such a situation, use 30° bank turns and inform the controller. Do yourself and the controller a favor—try one or two next time you are in the radar pattern. (AFM 51-37)

ABBREVIATED CLEARANCES

We have become accustomed to hearing "KEG 10 is cleared as filed, maintain FL 230 . . ." when we receive our ATC clearance. These abbreviated clearances make our job easier, but there are times when you cannot accept them (and ATC should not issue them). FLIP says ". . . an abbreviated clearance cannot be issued or accepted if the route of flight originally filed with ATC has been changed by the pilot. In this case, the pilot will request a detailed clearance be issued by ATC." This is the only way you can be sure your flight plan was actually received by the appropriate agencies. The next time you have to refile, get a detailed clearance. An ATC violation could ruin your whole day. (FLIP, General Planning, Chapter 5)

CELESTIAL NAVIGATION TRAINING

The new edition of FAA Handbook 7610.4C has placed some new limitations on celestial navigation training flown within areas of ARTCC radar coverage. This change requires the pilot to obtain ATC approval prior to discontinuing conventional navigation and beginning celestial navigation training. It also requires him to advise ATC when this training is terminated. The pilot must advise ATC before initiating any heading changes of more than 20 degrees and must remain within 30NM either side of the assigned course unless otherwise authorized by ATC. This will require pilots to monitor the aircraft position more closely and to receive specific clearance prior to deviation from this corridor. If the limits of the corridor are exceeded, you may be required to correct toward course or you may receive an ATC vector to avoid traffic. Remember, an ATC vector will be a magnetic heading. If you are flying a grid navigation leg, this heading will have to be converted to grid. This is not as hard as it may seem. Note on your map the grivation lines similar to magnetic variation lines except they are dotted green instead of blue) closest to your present position. Add the number of degrees indicated to the controller's magnetic heading when east grivation is shown and subtract west grivation. Your navigator can explain this further. Early anticipation and close coordination with ATC may prevent lost training during celestial navigation; however, prior planning and coordination with all concerned crew members is the key to a successful mission. (FAAH 7610.4C)

BACK TO HAUNT US

The B-47 is gone—but the IP game is the same . . .

MAJOR ARTHUR C. HOOD
93d AREFS, Castle AFB

"It's almost 8:00 and heat waves are beginning to rise from the runway. The pilot calls for the before takeoff checklist and we complete the items together. In the tandem cockpit I can't see him; he's hidden by his ejection seat. The navigator is further forward in the nose of the airplane. The only person that I can see is the standboard nav strapped into the jump seat on the floor by my feet.

"The pilot closes the canopy and I check the pins in my side rails. The power comes up, and wings sagging, the B-47 waddles onto the active. Engine sound vibrates through the airplane and the instruments become a puzzle of moving needles; but wait, the power's off. Aborting!

Once off the runway, the pilot gets cleared off tower frequency and I switch in 311.0 for him. I listen to his conversation with the command post.

"Can we go dry?" Where's my takeoff computer? I should have worked that out at mission planning. What's the temperature now? It must be climbing fast.

"Just a minute, sir, I'm working as fast as I can." Maybe I should work this one out on the charts, it's going to be tight. No time, he wants an answer now. This computer has more scales than the law allows.

"Yes sir, we can make it." Switch the radio to ground control, clearance is still good, run the checklist again, what's the new check timing? I'm getting behind!

Once again we're rolling. Sure can tell the difference without the water. The wings are just beginning to flex. I missed the check timing. That's the four marker and only 115 knots. We sure are using up the concrete without that water. This is going to be close. The one marker. Whew, we're off! Gear up, got to clear that little hill—we're losing airspeed. It's buffeting. Maybe we can touch down flat . . .

At 18 minutes past 8:00 a.m. a B-47 crashed on takeoff from one of our midwestern bases. Impact was flat. The airplane slid for almost a mile, breaking up as it went. It was totally destroyed in the ensuing fire. All four on board died. The only road near the crash site was rapidly blocked by dependents and base personnel trying to reach the scene in their cars. This delayed crash equipment. The accident board was convened in a matter of hours. Experts poked through the smoking wreckage, but could find nothing wrong with the airplane that hadn't been caused by impact or fire.

Over a decade has past since that accident. The base has long since been closed and the last B-47 had made that final flight to Davis-Monthan, but that crash sticks in my memory more than any of the others. I remember it like yesterday. A big crew meeting was held at the hurry house. It dragged on late into the night. Gallons of coffee were consumed. Opinons raged in from all sides. Gradually the discussion centered on one man. He was a squadron IP and to me he seemed an ancient major—filled with wisdom and experience. He asked how many instructor pilots were there. Several hands went up.

"We are to blame for that crash," he said. The room grew silent. He had everyone's attention.

The pilots who had raised their hands were obviously uncomfortable. The major stood with one foot up on a chair. He toyed with his coffee cup. Then he started talking again.

"That crash started months ago when we upgraded the pilot and when the copilot signed in from CCTS. We filled the squares in the checkout program and we taught them to pass a standboard. They died because of poor judgment and no crew coordination. And we don't teach it."

Someone started to ask a question. "I know what your going to ask," he said with a gesture. "How do you teach judgment? That's copping the plea. We are paid to teach it and we do it with time and patience and by not being the first one to happy hour. Among the IPs in this room there is an awful lot of experience. We're instructors not because we are geniuses but because we were lucky enough to have survived our stupid mistakes. Another half dozen knots of airspeed and that crew would have made it. You can bet your flight pay that had they made it, that pilot would never have let himself get backed into a corner like that again."

"I still don't see how we could have prevented that one," said a slick wing captain from the background. "We teach the numbers and preach the book. People still make mistakes."

The major studied him for a moment. "Seems to me you had a simulator this morning. What time was that?"

"Eleven."

"But I had lunch with you a little after 12:30; seems to me that a simulator period is three hours long."

The captain flushed. "We finished the lesson plan early."

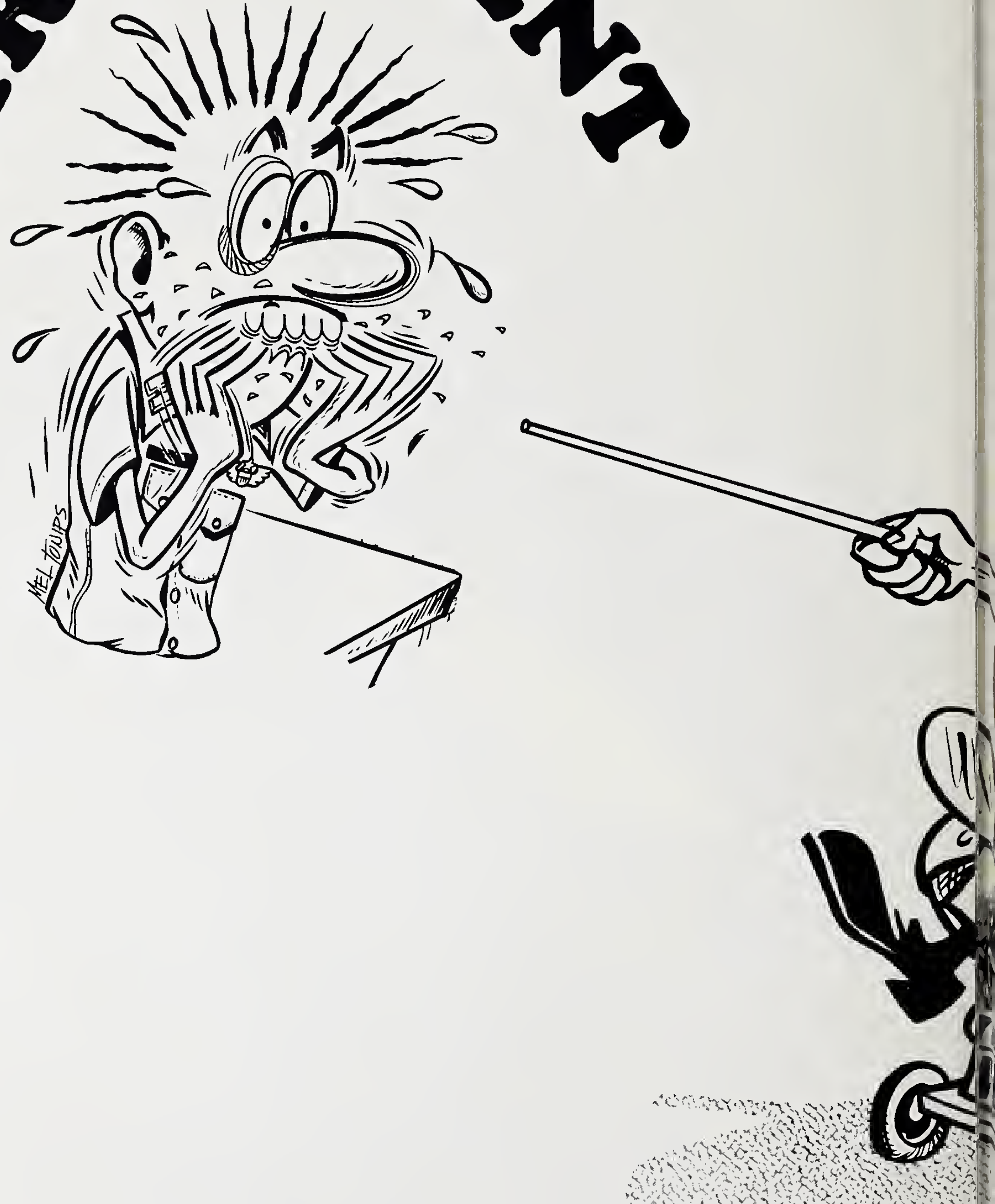
The bait had been taken. The corners of the old major's mouth turned down and he set the hook. "Six weeks ago I gave your copilot an instrument check. I passed him but he sure was weak. A week later you got him on your crew and I talked to you about him. Has he improved so much in five weeks that he can't use an hour and a half of simulator time? You've been an IP for what—four months now? You could have taught a little technique in that time."

The room was silent. The captain, red faced, stared at the major. The old IP lit a cigarette, took one drag and crushed it out. "It's unfair of me to single out one man and make him the goat. I am just as guilty, if not more so. I've been around a lot longer and I haven't been doing everything I could have. To be honest, none of us have. I think we'd better get together and revise our approach to our jobs." He looked at his watch. "It's past 1:00. I've said enough for tonight." He turned and walked out of the room. No one said anything for a long time.

In the months that followed, the old major seemed to be everywhere. I flew my first front seat ride in the B-47 with him. It was a humbling experience. I never flew with him again without being prepared. We had our own simulator at that base and often as not I would find him there when I went for routine training. His training was never routine. I never got near him without learning something. He rapidly became known as Pappy to the younger pilots. They respected him with an intensity that bordered on worship. I think he was unaware of this. He never used the cutting manner again that he had used on the captain that night, but he made every point with quiet sincerity. There are a lot of pilots alive today because they knew Pappy. The accident I described was the ninth in fifteen months. Three months later there was another. All on board lived. In the year that followed there were none. Maybe Pappy's crusade had nothing to do with that, but I'm inclined to think that it did.

CAPTAIN H. WILLIAM DETTMER
744 BMW, Beale AFB

ALL THIS HARASSMENT



A crewmember I know recently bemoaned the fact that his day off was spoiled by scheduled ground training—a recurring quarterly class in B-52 fuel panel operations directed by the wing commander. Sad to say, he probably got little out of the class due to daydreaming about his plans for later in the day and a parade of harsh thoughts; i.e., “Why do they have to harass us with aggravations like this? I’m already checked out.”

The fact is there is a need for continuous review. The B-52 can be a nightmare. It has enough aluminum and steel in it to make 20,000 garbage cans. If all the wire and cable were laid end to end, it would stretch 100,000 miles. The combined power of its engines is equal to 12,000 locomotives. And it flies like 12,000 locomotives pulling 20,000 garbage cans on the end of 100,000 miles of wire. The aircraft systems are really a bad trip. Boeing has built an airplane of exceptional capabilities in the B-52; but it is also probably the most complex airplane in the world—a tough airplane to fly safely and with authority. By comparison, transition into almost any other aircraft is easy.

As if the airplane’s complexity were not enough, the crews flying them now are less experienced than ever before. The SAC bomber crew force averages less than eight years and 2000 hours of flying experience, with plans to bring that figure to a maximum of six years. At the present rate of flying training, that equates roughly to 1200 hours of flying time. Many crews are composed of “junior” nav teams—second and first lieutenants paired at nav-bomb training. Recently the integral crews coming to local units from the CCTS at Castle AFB have included pilots with no SAC experience and, worse, no copilot experience in the B-52. With the days of the ARC LIGHT combat TDYs behind us and the drastic reduction in flying time, there is virtually no opportunity for the newer SAC crewmembers to pick up valuable flying experience in a short period. A far cry from the days of the 18-year crew commanders and radar nav’s with 5000 flying hours!

The B-52’s advancing age poses additional problems with potential increased incidence of inflight emergencies, systems and parts failures, and a general decrease in the quality of aircraft performance. While the age of the airplanes is going up (and the skills required for operating them increase), the experience level of the operators is going down. All things considered, future accident prevention will be a real challenge, and it will take a lot of effort at all command levels to save lives and aircraft. This is why the wing commander’s fuel panel class entered the picture.

Why did the boss direct this training?

It wasn’t a little bird that told him the pilots were weak in fuel panel operations. He didn’t hear it on the grapevine. He found out about it at the SRP; the standardization evaluation review panel (SRP) is not a term familiar to most crewmembers. The SRP is one of the commander’s most valuable tools for insuring safe operations. It affords the wing commander and his staff the opportunity to review trend analysis of the local stan/eval division. Besides keeping detailed records on aircrew performance in every area of aircraft operations, the stan/eval division compiles statistics on Quarterly and annual evaluation failure rates, the areas in which failures occurred, and actions assigned to correct the deficiencies. All this information is presented at the SRP.

All deficiencies graded less than qualified on evaluations conducted during the previous quarter are reviewed. A three month quarter normally provides a sufficient sampling of activity to identify trends that might be unfavorable. If such a trend is noted, the wing commander can direct changes or improvements in the training program to rectify the problems indicated by the trend. Orders for the changes are normally given directly to the tactical squadron commanders, the deputy commander for operations, or training (DOT). They are charged with implementing the corrective training and are answerable to the wing commander for its success or failure.

For example, if the SRP turns up seven or eight unsatisfactory grades in emergency procedures testing or manuals currency, the commander would probably direct the flying squadrons to tighten up manuals control and increase emergency procedures training. This normally takes the form of practice emergency procedures exams and supervised tech order control. At successive SRP meetings, previous trends are discussed. If the corrective training has eliminated the unfavorable trend, the training is either continued or discontinued at the wing commander's option. If the trend remains evident, another solution may be attempted. Or perhaps more of the same medicine is prescribed.

It is especially sobering to be present at a stan/eval review panel meeting and see an unfavorable trend presented in a safety related area. Recently trends have appeared in fuel panel operations, celestial navigation, low altitude navigation, and crew coordination. These trends pose serious safety consequences. But timely action by the wing commander and his staff can head off a tragic accident. Try sitting in on an SRP meeting sometime. Put yourself in the boss' shoes. What would you do if you were faced with an unfavorable trend in an area that could cost someone his life—for instance, fuel panel management? You'd probably take a bunch of reluctant pilots and send them to a quarterly review class in fuel panel operations. So consider the motives and reasoning behind some of the harassment you have to endure. Maybe you can't see the reason why, but it is there for a reason, and it may save your life.

The RC-135 and its crew were returning home after a long overwater mission. They had been airborne for more than 20 hours. Their sortie included three receiver refuelings (two of which were to maximum inflight gross weight) and a night landing stateside. The primary AC, a captain, flew the first track and had to contend with turbulence and weather for most of its length. When they were finally in the clear and things had settled down a bit, he turned control over to his copilot, who completed the refueling. Responsibility for the other onloads was shared by the pilot and the other AC on board.

Back in the CONUS and about two hours from the home drome, the pilot got back in the left seat in preparation for landing. His copilot contacted metro, computed landing data, and ran through the descent checklist with the pilot, who then started down on a normal enroute descent to a precision final.

Landing weather was reported to be 900 feet overcast, five miles visibility with fog in the vicinity of the field. The runway had an up-hill slope and was equipped with VASI and high intensity approach lights which had been turned up to compensate for the lower visibility.

The pilot flew an on-course, on-glidepath final approach down to decision height to a normal touchdown point. Although the final approach looked good to the pilot, the aircraft touched down sooner than he had expected, bounced, and floated for a short distance down the runway.

While still in ground effect, the pilot decided to play it safe and take the airplane around. He actuated the RGA switch, increased thrust on the RC's fans, and immediately started the flaps up to 30 degrees. The aircraft settled back to the runway momentarily, then lifted off smoothly and remained airborne. The pilot made another approach and an uneventful final landing.

After engine shutdown, the pilot made his customary postflight walk-around. As he approached the tail section, he saw that an antenna housing, located where the boom pod would be on a KC-135, had been severely damaged by contacting the runway. Presumably this happened during his first approach.

An investigation board was convened soon after the incident. Maintenance could find no problems with the flight controls, FD-109 Flight Director, or any other aircraft system. Weather was not a factor according to the investigators, since the pilot had become proficient in making

Z Z Z Z ZZZZZZZZZZZZZZ

CREW REST

approaches to this runway under more adverse conditions than were present the night of the accident. The flight surgeon declared the crew free of physiological impairments that could have affected flying ability or judgment.

Prior to flight, the pilot and his crew had complied with the crew rest requirements of AFM 60-1 and its SAC supplement. The board concluded that an error in depth perception occurred just before landing, caused by fatigue and compounded by darkness, fog, and brighter than normal runway lighting. This, in addition to a pitch-up in aircraft attitude, brought on by accelerating turbofan engines and rapid repositioning of the flaps, caused the antenna to strike the runway.

Long, physically demanding flights, such as this one, have become a part of daily life for many of us in SAC. Fatigue factors involved are not selective—they affect pilot, navigator, boom operator, and gunner alike.

Adequate rest will minimize fatigue and help insure the best possible performance in flight. How many inadvertent disconnects could have been avoided, or how much closer to that end nav point could you have been if those extra hours on the putting green, in the pool, or wherever, had been spent on a little extra shuteye prior to coming in to fly? If you are unable to actually sleep as much as you should during scheduled crew rest, then at least do rest. A low level of physical activity prior to flight will greatly reduce onset of inflight fatigue.

It is the responsibility of every crewmember to be thoroughly familiar with the crew duty/rest requirements set forth in AFM 60-1. It is even more important to observe their letter and spirit. The safety of you and your crew, not to mention the success of your mission, depends on it.

# of ARAs and MOUNTAINS

CAPTAIN JAMES A. FAVERO
22 AREFS, March AFB

After a normal tanker night training mission at altitude, the crew was preparing to fly an airborne radar approach (ARA) into home base. The ARA procedure coincided with a published HI-TACAN and necessary coordination with center was accomplished. Published inbound course of 316° and the IAF was 45 miles on the DME. Penetration was started from FL 240 as cleared, to be at or above 10,000 feet at 30 DME. A right drift was noted on the Doppler and appropriate corrections were made. The pilots noted that CDI indications agreed. After 30 DME, the next restriction was to be at or above 6000 feet at 20 DME, and then at

or above 3700 feet at 12 DME; at or above 2500 feet at 7 DME; at or above 2000 feet at 5 DME, which was the FAF, and then missed approach at an MDA of 1800 feet and 3 DME.

At the 12 DME fix, a CDI deflection 5 degrees right of course was noted. The navigator said that he was having difficulty breaking the base out of surrounding ground clutter. At this point the tower saw that the aircraft was right of course, and warned the crew of high terrain in their vicinity. At the FAF, the aircraft was 7° right of course as indicated by the CDI. Cognizant of the 2673 foot high mountain but unsure of its relative position to the aircraft, the descent to 2500 feet was broken off and level-off was established at 3500 feet. At this point, a left turn was directed by the navigator to correct to the final approach course. The pilot checked his outside references and determined that the correction to course would keep him well clear of the mountain. Fully aware now of how far right of course they were, the pilot initiated a missed approach. At this same time, the tower again warned of high terrain, then at the crew's nine o'clock position.

The crew wisely avoided a potential mountaintop engagement by heeding the tower's high terrain warnings which they validated with CDI readings. After all, that's why we fly ARA's using a published FLIP terminal penetration and approach. The point is, what if the tower warnings hadn't directed attention to their position relative to the mountain. Being so far right of course is bad enough, but if the CDI were in error by the maximum allowed plus or minus four degrees, or even more, and the crew failed to recognize the error, there is no telling how far off course they could have been. In addition, they could conceivably have been at or below the 2673 foot high mountaintop at the 9 DME fix while descending from 3700 to 2500 feet.

Three important factors about this experience should be considered. First, be certain of the accuracy of the navigation aids. AFM 51-37 spells out procedures for proper ground check of TACAN and VOR. Know the nav aids and their characteristics, and be certain they are within established tolerances. The only place nav aids can be properly cross-checked against a known reference, on most airfields, is at the hammerhead area. Signs are posted there for altimeter, TACAN, and VOR checks. Since the radar on the KC-135 isn't the finest piece of equipment of its gender in the inventory, treat it with a healthy respect for its more obvious limitations.

Second, pilots should have a familiar set of personal tolerances by which they can monitor the performance of their copilots and navigators. Depending on local terrain features a plus or minus five-degree CDI deflection might be a good guide to use for a reference point beyond which corrective action on an ARA will be taken by the pilot. If the situation looks doubtful, the pilot should not hesitate to take charge of the approach and correct back to published course.

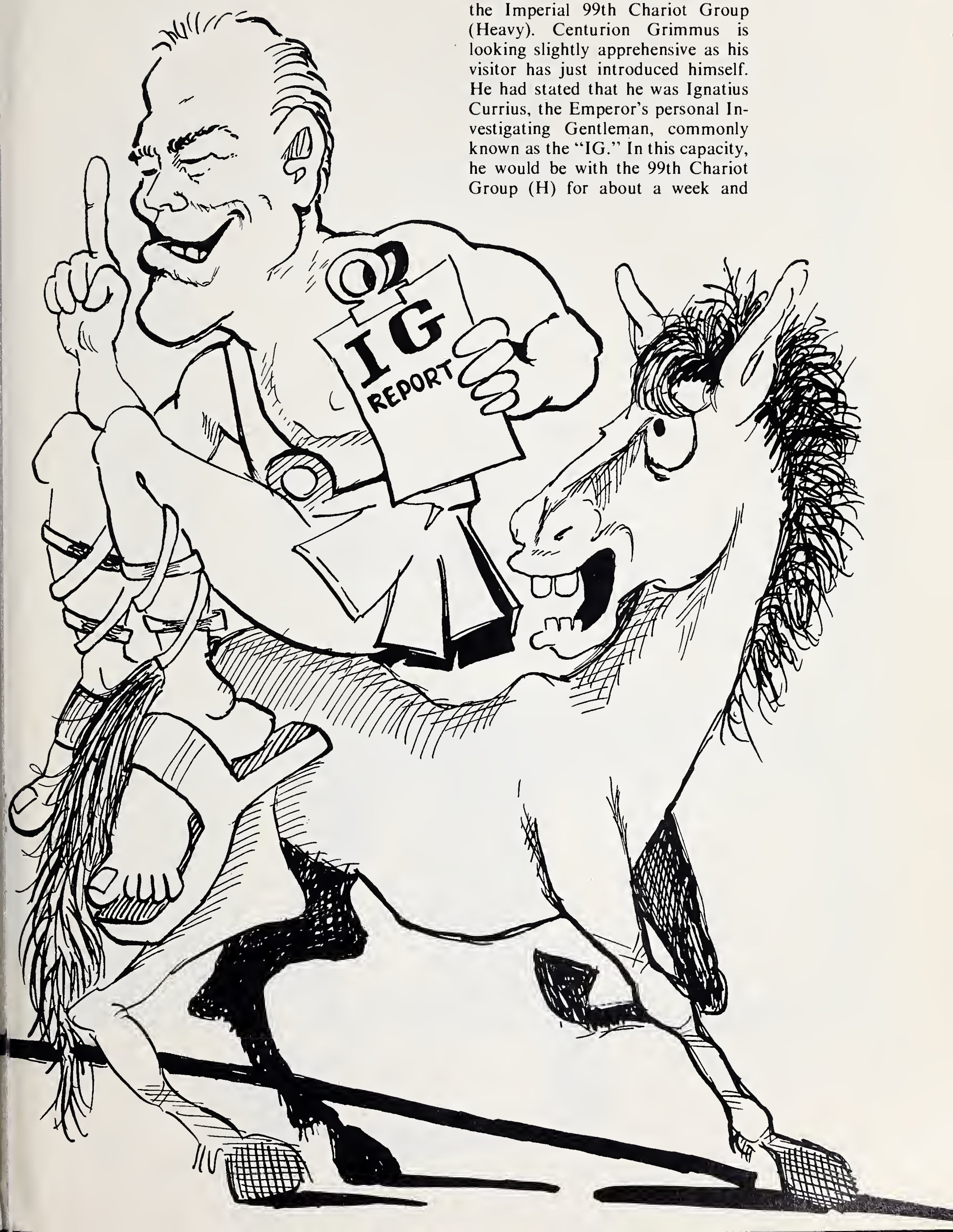
The third point to consider is to conscientiously prebrief the approach with emphasis on the conscientious. Don't just read the approach plate. Note what the inbound course is and how it lies in relation to surrounding high terrain. Review and brief the approach on mission planning day, and again during the descent checklist; only this time consider such added factors as current weather, darkness, high terrain, winds, and an alternate plan of action in case the TACAN or the VOR fails. If the plan is to fly an ARA have the navigator give the briefing, emphasizing the above points.

With reduced operations overseas, most of us are flying only two or three times a month. Proficiency has accordingly become harder to maintain. Some extra ITMs in the simulator wouldn't hurt any of us. There, if we make a mistake, we can stop and talk about it. A mistake in the airplane may not have such a nonchalant outcome.

TIMES have changed... or have they ?

COLONEL ROBERT D. SMITH
Air War College, Maxwell AFB

The year is 64 B.C., and the setting is the office of Octavius Grimmus, Centurion in Charge of the Imperial 99th Chariot Group (Heavy). Centurion Grimmus is looking slightly apprehensive as his visitor has just introduced himself. He had stated that he was Ignatius Currius, the Emperor's personal Investigating Gentleman, commonly known as the "IG." In this capacity, he would be with the 99th Chariot Group (H) for about a week and



would be checking many local procedures. He would be observing proficiency as well as compliance with the Imperial Commandant. Octavius Grimmus knew that the tension on the arming levers of his slings were up-tight and they hadn't bent a spear in months out in the weapons storage area. He was a little concerned, however, about the chariots themselves as the lubrications had been a little slipshod lately. By Jupiter, you could blow the whole program by losing only two chariots on the Big Gallop demonstration. Well, nothing would be gained by brooding about things that should have been done yesterday, so he strode purposefully down the hall toward the Battle Staff room where the leaders of his legions awaited the glad tydings.

One week later, Centurion Grimmus was sitting in his office contentedly studying the report of the IG visit. They had been awarded a "magnificent" on Weapons Delivery Capability and the exemplary "Maximum Magnificent" on Weapon Reliability. The Big Gallop had been a resounding success! Since these were the only two items that could have failed the 99th Chariot Group (H), he skipped ahead to the compliance portion. It was apparent that his subordinate commanders had much work to do. It never ceased to amaze Octavius that the IG team could delve into so many things in such a short time.

Now, how had they discovered that those two chariots had been out of commission for three weeks due to supply not being able to get axel hub dowels? The chariot support mobility teams had displayed their usual stellar performance and had received a solid "Tremendous" rating. It was gratifying to see the "Maximum Magnificent" ratings of the XII Maintenance Squadron's testing and operation's Pre-Gallop briefings for the chariot teams. The Centurion would probably have awarded the Disaster Preparedness Test even lower than the IG's "Minimum Wonderful." We have a long way to go there, he mused.

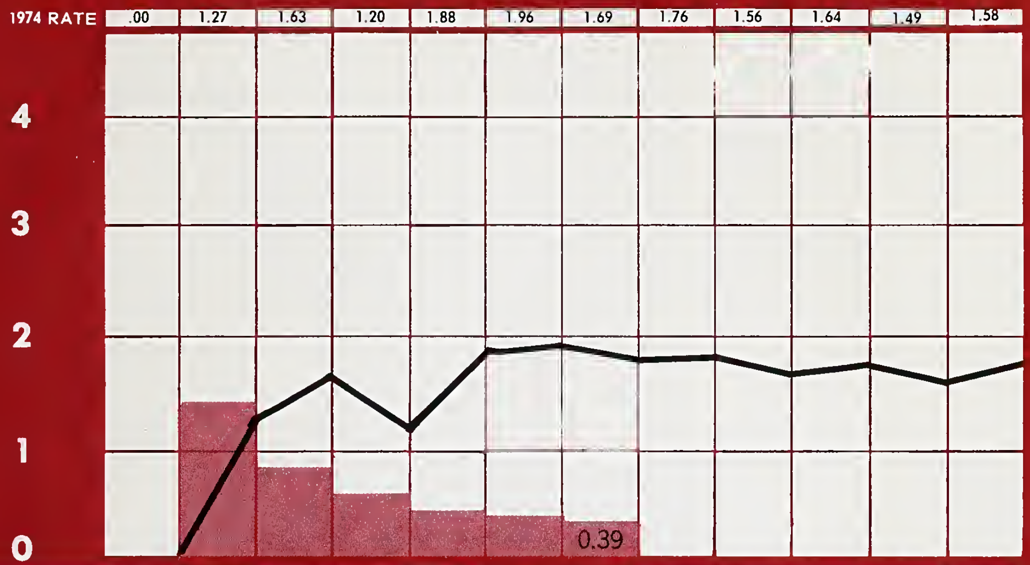
Well, all in all, it had been a good exercise. The refueling chariots had been a little overanxious and spilled some oats during the mid-gallop transfer to the spear chariots, but it also could have been the horses' fault. It seems a little unfair to lose all four spears from Chariot 626 due to the charioteer having some pictures of the target in his tunic pocket, but that decision would be reviewed by the Emperor when he sent his comments. Basically, the slaves had performed well, so the Centurion decided to forego the weekly "execution-for-morale purposes" and throw a big "booze bust" for them. It probably wouldn't work, but it never hurts to try something new with a limited resource like the slave groups—maintenance and operations as well. There was a lot of work to do, but it could all be handled by the Centurion and his people, so he closed the report and called for his chariot to go home. It certainly will be nice when the discrepancies that the Investigation Gentlemen had pointed out are corrected. The Emperor had predicted that the team would be disbanded within two more years since everyone would be perfect by then and would not need to be helped any more.

No, times really haven't changed all that much, have they? Sure, we have modern weapon systems that don't eat oats, and our support has been refined considerably. We change certain parts on our weapon systems on a frequency that should limit materiel problems to random failures. Our primary interest, however, should be the same as before—the performance of our people determines the effectiveness of our unit. Are your personnel highly motivated toward success? It is doubtful that the "public-execution-for-morale" principle would go very far in today's volunteer Air Force, so we must look elsewhere. A unit going into an inspection of any type will do better if its personnel know what to expect, believe that they can successfully complete their individual tasks, and know that their careers will be improved by their efforts. We as managers must use our various training programs, commander's calls, newspaper articles, etc., to accomplish this education and motivation.

When we all reach 100% effectiveness, maybe the Emperor's prediction will come true and the inspection teams will be disbanded. Don't bet your chariot on an effective date, however. ⟶

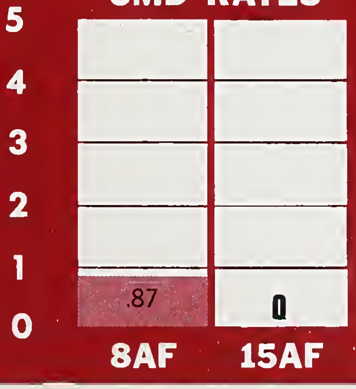
1975 Flying Safety Rate

★ SAC MAJOR ACCIDENT RATE (PER 100,000 FLYING HRS)



ACCIDENTS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1974	0	1	1	0	2	1	0	1	0	1	0	1
1975	0	1	0	0	0	0	0					

1975 SUBORDINATE CMD RATES



ACCIDENT STATUS

FB-111	FEB 75

LEGEND =1974 RATE

PROFESSIONAL PERFORMERS

Individuals selected for these pages as SAC's top professional performers of the month are chosen from nominations made by all SAC units. Selection is made only after all nominations have been carefully screened and those chosen meet the highest standards of excellence as outlined in SACR 127-2.

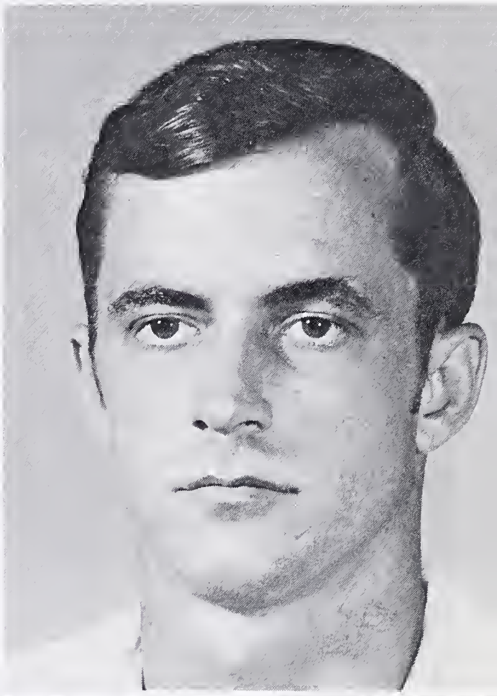
FLYING CREW

Captain Melvin L. Westerfield, a B-52 instructor pilot/flight examiner, was conducting a pilot upgrade evaluation for Captain Thomas V. Polonis of the 2d BW. Upon initial leveloff, the altitude hold function of the autopilot was engaged for the cruise portion of the mission. One hour later, the autopilot was disengaged in preparation for air refueling. After autopilot disengagement, neither pilot nor copilot could manually displace the control column to position the elevator. The control column was frozen in the neutral position. At this time they were 1,000 feet below and one mile in trail with the tanker. With both pilots simultaneously pushing on the control column, the column jerked forward one-half inch; this movement resulted in a 300 fpm rate of descent. Both pilots then pulled back on the yoke and the descent was stopped after losing 1,000 feet. As the aircraft appeared to be coming through level flight, the altitude hold mode of the autopilot was re-engaged. The autopilot recovered and the aircraft flew a constant altitude.

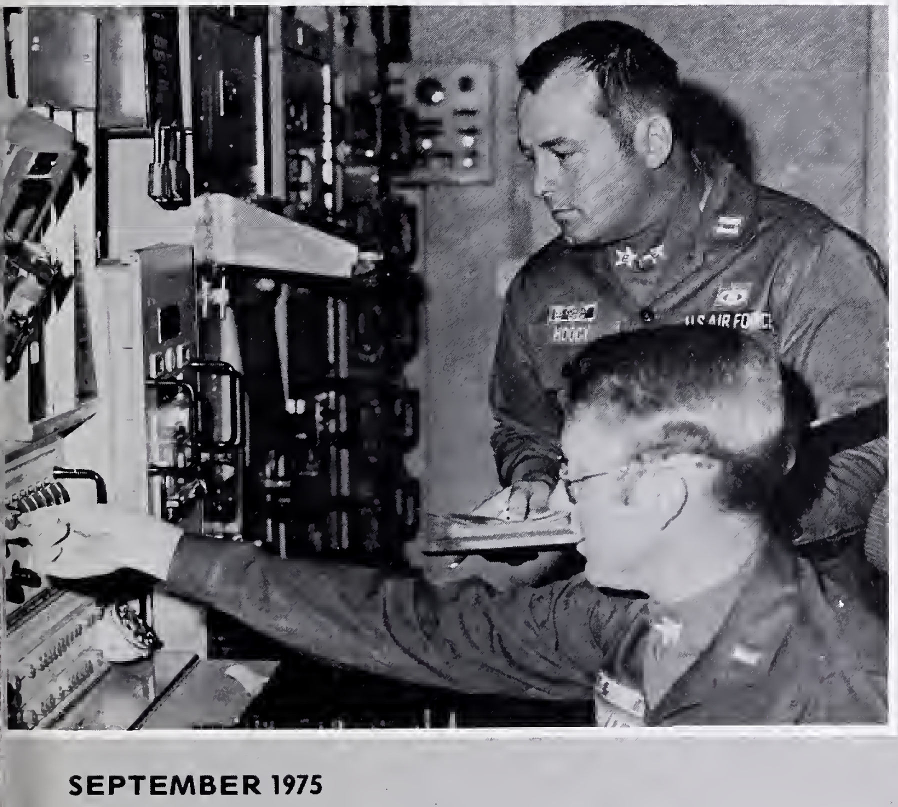
An emergency was declared and the aircraft returned to Barksdale. At that time the aircraft was uncontrollable but responded normally with any mode of the autopilot engaged. A decision was made to make the approach and landing using the low level mode of the autopilot. The aircraft was then vectored to a 25 mile final for a GCA approach. Over the overrun, due to the demands made on the autopilot to align the aircraft with runway center line, the autopilot disengaged four times. After touchdown, rollout on the runway was uneventful.

PROFESSIONAL PERFORMERS

TITAN Crew R-104. 308SMW, Little Rock AFB: MCCC 1/Lt Richard L. Davis, DMCCC 2/Lt John S. Crook, MSAT Sgt Phillip M. Johnson, MFT TSgt Sherman Smith.



Maintenance Man. Staff Sergeant Gilbert A. Elmy, 307 Organizational Maintenance Squadron, U-Tapao Airfield, Thailand.



MINUTEMAN Crew E-148, 90SMW, F. E. Warren AFB: MCCC Capt Howard Q. Moody, DMCCC 2/Lt John E. Schutt.

THE AVERAGE OF ONE

MAJ JOHN L. SNOW

You probably know the giant 747, the first of a new generation of jet aircraft was introduced into civil aviation service just a few years ago. But you probably didn't know that to facilitate the rigorous regimen leading to certification, literally hundreds of manufacturers who subcontracted for systems for the behemoth had, through exhaustive study, testing and analysis, determined the "mean time before failure" of their own part of the airplane!

From hydraulic system to standby compass, the MTBF (mean time before failure) has been calculated to an exact period of use hours.

Actually, unknown to the average bird, the MTBF concept has long been widely accepted throughout industry for a variety of reasons. Certainly the economics are obvious; the inspection and certification are more readily accomplished and manufacturers and users both derive a great sense of confidence through built-in sets of mechanical-electrical checks and balances.

The concept you'll agree, makes sense. The lines can operate more economically, the traveling public can fly safely and the insurance companies can reduce actuarial premiums.

But what is the mean time before failure of a human being?

Wanted: Multiengine jet aircraft pilot. 2500 hours minimum. Must possess type ratings in the KC-135; B-52; FB-111; U-2; SR-71. Graduate degree in aeronautics, physics, chemistry, mathematics or allied fields required. Maximum age 25. Must possess a human mean time before failure rating of 30 years. Home alert, ARC Light and Linebacker experience required. Apply: Hq SAC, Offutt AFB, Nebraska.

A ridiculous ad. Maybe, but a fascinating concept.

Psychologists tell us that there is no positive method to determine an individual's psychological make-up in the exacting terms required in the nuclear age. We can anticipate character weaknesses which would prevent selection for duty in this capacity, and there are disabling traits that prevent continuation in this duty after discovery. But can we anticipate a breakdown in a "normal" person? Can we list and then detect abnormalities that will precede collapse?

Wouldn't it be simpler to be labelled with a precise functional description such as this:

Man, SAC pilot, IQ 135, manufactured 2 May 1940; Limitations. Require 6-8 hours uninterrupted sleep before use; must be fed at least three times daily. Mean Time Before Failure: 14 years, 5 months, 9 days. Warnings: Do not exceed this time period; to do so could result in...

A major aircraft accident? A bent B-52? Eight blown tires? Death?

Are there signs that can indicate to commanders that the human MTBF has been exhausted? Is there a readily detectable set of behavioral traits whose appearance make a change mandatory? Can we find in ourselves the slightest warning of approaching failure?

Medically, the human aging processes are definite and the annual physical detects most, if not all, of these. This leads to routine "people maintenance." We can even anticipate some of these aging factors and prevent large scale bodily breakdowns. The flight surgeon has extensive records of John Q. Pilot from his acceptance for pilot training to the present.

But what of John's inner self? It is extremely difficult if not impossible to really know what makes him different from his contemporaries. We could determine John's dominant interests and label him introverted or extroverted depending upon his responses. This, however, is a tiny inkling of John's personality. Hardly enough to identify the warning signals announcing the approaching of John's mean time before faiure.

Other problems begin to surface as we pursue this study. We are not dealing with an "average" person. What is average? Perhaps we need a scale to identify the danger signs of John's imminent breakdown in efficiency. Even so, we would be dealing with a mean and not an individual. Traits of personality failure would have to be referenced to a standard that yields

an "average" response and not being individualistic, the reference would probably be useless. Caution must be raised to assiduously avoid stereotyping and generalities and instead turn to emotional reactions that we may recognize: anxiety, frustration, conflict, discord, self-preservation, and complacency.

These signals may alert us to John's mental attitude and outlook, but only if a marked and persistent trend is apparent. Yet, if detected, each can provide better understanding of the man with whom we are dealing.

Anxiety is an emotion we all manifest at one time or another. The reasons for anxiousness must be known for it to be of any real value. True, if John suddenly was apprehensive about his landings, we would be promptly alerted. But that would also be a direct indication of breakdown and not an announcement of the approach of the end of his mean time before failure.

Frustration would very possibly be revealed only if we were on the closest terms. John's psychological motives, for that matter, all of ours, are less fixed and dependable than are his organic needs and thus these indices of frustration can reliably be considered only if the cause is known. Aggressive behavior, while immediately obvious, could indicate frustration but could also be his attempt to be self-assertive, a normal reaction in any human. Identification of frustrations serve no real purpose if the cause for the frustrations remained.

Conflict and discord can be examined in the same vein: A view toward conscious and unconscious motivation must be considered. They may well be a valid indication of "reaction" rather than conscious "action."

Self-preservation as an overt sign of distress has to be considered in the light of being instinctive—if any human response can be truly called "instinctive." John can be said to possess a highly complex computer in the form of his brain. He has been "programmed" to respond to a variety of stimuli and his nominal reactions are predictable. But he can be "overprogrammed" in which case his instincts in the event of breakdown would revert to basic—self-preservation. The analogy might be made here of the American astronauts nearing the surface of the moon and being faced with an overtaxed computer whose functions have been demanded to the point of failure-alarm. They overrode the computer and landed without further incident. If John's "onboard" computer fails, the alternate mechanism is that of automatic and reflexive self-preservation. This would be an obvious indication of the complete consumption of John's mean time before failure—but only moments before it replaces the years of training. At this time, it is too late to be of value except to the accident investigation board.

Complacency has to be the antithesis of fear for its basic foundation is quiet satisfaction, smugness and contentment. This feeling of well-being has its place but not in the cockpit of a high performance aircraft. The opposite of complacency is the pilot who is overcautious and even demonstrates a highly developed sense of caution by adding a few knots on final for mama and the kids.

It is one thing to preach about the weaknesses inherent in complacency but quite another to detect it as one of the warning devices of John's mean time before failure expiration. The prestige and sense of well-being derived from being consulted and from being made to feel important helps to satisfy our needs for responsibility but can be excessive and even promote that same complacency we are told to guard against.

We do not have a median or level of reference that can be applied to the complex group of highly intelligent individuals that comprise the combat crew force of the Strategic Air Command. They are not "average" in any sense of the word or by any standards save their own.

This conclusion, however, does not totally negate our attempts at arriving at a given scheme to establish a mean time before failure of an individual. It merely demonstrates the fact that each individual possesses traits that are to be found in many others—even most of our society. While they appear similar, they are individualistic aspects of personality; they must be considered on that basis. Hard and fast rules cannot apply as we know ourselves better than anyone else could ever hope to.

A good flight surgeon can make valid observations. He understands your job and you. A good commander can also watch for danger signals. They can detect warning signs that might indicate approaching exhaustion of the mean time before failure. In the final analysis, however, it falls to each of us to make every effort to recognize the approaching failure in ourselves and those around us, and to understand the implications of this approaching exhaustion of mean time before failure.

The touchstone is recognition. The deadly danger signs of cancer have been loudly broadcast. We know the warnings. The truth, therefore, of an approaching failure is best known to us—take a good hard look at the flags of caution raised in this article. It could save your life or that of your crew.

What is YOUR mean time before failure?

SAC Safety Screen

The SAC Safety Screen is an honor roll of SAC's most professional crews. To gain listing on the Screen, crew members must be nominated by their unit commanders and meet high selection criteria of experience in their aircraft or missile system *IAW SACR 127-2.*

11AREFS, Altus Crew E-107: P Capt John J Maroul Jr, CP 1/Lt Maurice W Calle, CP 1/Lt Russel M McInturff, IN Capt Keith K Meredity, IBO TSgt Edwin W Paul Jr

449BMW, Kincheloe Crew E-113: P Capt Jerry L Kroese, CP 1/Lt Robert L Glaze, CP 1/Lt William J Heilman, N Capt George B Wingard, BO A1C Melvin R Wiemer

449BMW, Kincheloe Crew R-20: P Capt John Graham, CP 1/Lt Pat Monroe, RN 2/Lt Rick Fisher, N Capt Mark Dinerstein, EW 1/Lt John Johnson, G Amn Dan Wruck

7BMW, Carswell Crew S-55: P Capt Kenneth R Day, CP 1/Lt Alvie E Murphy, RN Maj Kenneth P Adams, N 2/Lt Thomas P Tedor, EW 1/Lt Jerry D McEntire, G Sgt Thomas B Lindsey

2BMW, Barksdale Crew R-06: P Maj Frederick M Banks, CP Capt Sherril F Freesmeyer, RN Capt Benjamin F Janes, N 1/Lt Theodore R Skingel, EW 1/Lt William F Bynum, G Sgt Lester E Sabin

909AREFS, Kadena AB: P Capt Humberto M Otero, CP 1/Lt Porter B Calhoun, N 1/Lt James W Bowley, BO SSgt James A Cannon

6SW, Eielson Crew S-01: IP Capt Manning L Crump, CP 1/Lt Melvin J Parker, IN Maj William Glasz, NN Capt Norman K Arnold

6SW, Eielson Crew S-11: TC Maj Gene L Markle, R1 Capt Cassius A Harris IV, R2 Capt James P Cartmill, R3 Capt Henry D K Alau, R4 Capt Eric M. Hupp, MT Capt John M Kerkhoff, SC Capt Gary R Hewett, PT MSgt William R Dodson, ET TSgt James H Butts

28BMW, Ellsworth Crew E-116P: P Capt Jack O Liabraaten, CP Capt Douglas L Theobald, NN 2/Lt Kenneth A Suominen, BO SSgt Richard L Groat

93BMW, Castle Crew IT-31: IP Capt Leonard H Ritchard, RN Capt James F Claiborne, IEW Maj James O Pugh, IAG MSgt Jerry B Nations

319BMW, Grand Forks S-22: P Capt Dennis R Berg, CP 2/Lt Neal A Eriksmoen, RN Capt Gary T Sikkink, NN 1/Lt Ronald J Grzesiak, EW 1/Lt James P O'Leary, AG Sgt Dan L Morgan

320BMW, Mather Crew E-118: P Capt John M Nadolski, CP 1/Lt Robert A Dotson, CP 1/Lt Bennett W Jones, NN Maj Billy N Bell, BO Sgt Edward F Cavier

456BMW, Beale Crew E-165: P Capt Donald G Johns, CP 1/Lt William J Hogues, NN 1/Lt James E McMillion, BO TSgt George L Lester

44SMW, Ellsworth Crew E-014: MCCC 1/Lt Franklin J Blaisdell, DMCCC 2/Lt Charles E Bryant

44SMW, Ellsworth Crew E-156: MCCC Capt Charles F Lutz, DMCCC 1/Lt Marvin B Lamos

321SMW, Grand Forks Crew S-062: MCCC 1/Lt Gerald A Kolisch, DMCCC 1/Lt John T Weeks

341SMW, Malmstrom Crew E-151: MCCC Capt Forrest A Burkard, DMCCC 2/Lt Jerry J Andersen

351SMW, Whiteman Crew R-054: MCCC 1/Lt Carl R Behrens, DMCCC 1/Lt Warren W Kipps

381SMW, McConnell Crew S-052: MCCC Capt Ellery C Baker, DMCCC 2/Lt Donald L Foley, MSAT SSgt Dennis V O'Donnell, MFT SSgt Danny R Furniss

390SMW, Davis-Monthan Crew S-003: MCCC Capt John J Petty, DMCCC 1/Lt Roger D Geer, MSAT Sgt Richard E Duensing, MFT Sgt Larry E Brooks

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